Math 1050 – Exam 2 Review

Write each function in vertex form. State the vertex and axis of symmetry, then sketch the graph using transformations of $y = x^2$.

1. $f(x) = x^2 - 6x + 8$
2. $f(x) = -x^2 + 4x$
3. $f(x) = 3x^2 + 6x - 7$

Determine, without graphing, whether the given quadratic function has a maximum value or a minimum value and then find that value.

4. $f(x) = 2x^2 + 5x - 3$
5. $f(x) = -x^2 - 4x + 3$

Solve the problem.

6. A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 608 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed?

7. The cost in millions of dollars for a company to manufacture x thousand automobiles is given by the function $C(x) = 3x^2 - 18x + 63$. Find the number of automobiles that must be produced to minimize the cost.

Solve the inequality.

8. $x^2 + 4x > 12$
9. $2x^2 + 5x - 3 \leq 0$
10. If $g(x) = x^2 + 5x - 24$, solve $g(x) \geq 0$.

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x-intercept.

11. $f(x) = 2x^2(x-5)(x+3)^3$
12. $f(x) = (x-3)^2(x^2+4)$

Determine the end behavior (the power function that the graph of f resembles for large values of $|x|$) and the maximum number of turning points of f.

13. $f(x) = -3(x+7)(x-2)^2$
14. $f(x) = x^3(x+4)(x^2+5)$

Analyze the gaph of the given function f as follows:

a) Find the x- and y-intercepts of the graph of f.

b) Determine whether the graph crosses or touches the x-axis at each x-intercept.

c) End behavior: find the power function that the graph of f resembles for large values of $|x|$.

d) Determine the maximum number of turning points on the graph.

e) Put all the information together, and connect the points with a smooth, continuous curve to obtain the graph of f.

15. $f(x) = (x+2)^3(x-1)^2(x+1)$
16. $f(x) = -2x^2(x-2)(x+3)^2$

Find the domain of the rational function.

17. $R(x) = \dfrac{x-5}{x^2+3x+2}$
18. $R(x) = \dfrac{x^2+3x}{x^2-x-12}$

Find the vertical asymptotes of the rational function.

19. $R(x) = \dfrac{7}{x^2+3x-40}$

20. $R(x) = \dfrac{-x^2+4x-4}{x^2-5x+6}$

Find the horizontal or oblique asymptote of the rational function.

21. $R(x) = \dfrac{20x}{x+12}$

22. $R(x) = \dfrac{4x^2-3x+7}{x-2}$

23. $R(x) = \dfrac{x-5}{x^2+3}$

Graph the function. List all intercepts, vertical asymptotes, holes, and horizontal or oblique asymptotes.

24. $R(x) = \dfrac{x}{x^2-25}$

25. $R(x) = \dfrac{x^2+5x-6}{x+2}$

26. $R(x) = \dfrac{x^2+3x}{x^2+2x-3}$

Solve the inequality. Express the solution using interval notation.

27. $x(x+4)(7-x) \le 0$

28. $\dfrac{x^2-9}{x+2} \ge 0$

29. $\dfrac{x+2}{x-3} > 1$

Use synthetic division to find the quotient and the remainder.

30. x^2-3x+8 is divided by $x+2$

31. $3x^3-x+2 \div x-4$

Use the Remainder Theorem to find the remainder when $f(x)$ is divided by $x-c$.

32. $f(x) = x^4-3x^3+2x+1;\ x+2$

List the potential rational zeros of the polynomial function. Do not find the zeros.

33. $f(x) = -3x^3+5x^2-4x+12$

Use the Rational Zeros Theorem to find all the real zeros of the polynomial function. Use the zeros to factor f over the real numbers.

34. $f(x) = x^3-5x^2+2x+8$

35. $f(x) = x^4-2x^3+6x^2-18x-27$

Solve the equation in the real number system.

36. $x^3+5x^2-2x-10=0$

37. $2x^4+x^3+x^2+41x-21=0$

Information is given about a polynomial $f(x)$ whose coefficients are real numbers. Find the remaining zeros of f.

38. Degree: 4; Zeros: $2-i,\ 4i$

39. Degree: 3; Zeros: $5,\ -2+3i$

Form a polynomial $f(x)$ with real coefficients having the given degree and zeros.

40. Degree 4; Zeros: -3, 1, and $2-i$

41. Degree: 5; Zeros: 2, $3i$, and $-1+4i$

Use the given zero to find the remaining zeros of the function.

42. $f(x) = x^4+2x^2-63$; Zero: $3i$

43. $f(x) = x^3-3x^2-5x+39$; Zero: -3

Find all the complex zeros of the function and write the polynomial as a product of linear factors.

44. $f(x) = 2x^4+3x^3+6x^2+12x-8$

45. $f(x) = x^3+11x^2+36x+26$